NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

RIPARIAN FOREST BUFFER

(Ac.)

CODE 391

DEFINITION

An area predominantly trees and/or shrubs located adjacent to and up-gradient from watercourses or water bodies.

PURPOSE

- Create shade to lower or maintain water temperatures to improve habitat for aquatic organisms.
- Create or improve riparian habitat and provide a source of detritus and large woody debris.
- Reduce stream bank or shoreline erosion.
- Reduce excess amounts of sediment, organic material, nutrients and pesticides in surface runoff and reduce excess nutrients and other chemicals in shallow ground water flow.
- Reduce pesticide drift entering the water body.
- Increase in-stream processing of organic material, nutrients, and other chemicals.
- Restore native riparian plant communities.
- Increase carbon storage in plant biomass and soils.

CONDITIONS WHERE PRACTICE APPLIES

Riparian forest buffers are applied on areas adjacent to permanent or intermittent streams, lakes, ponds, and wetlands. They are not applied solely to stabilize stream banks or shorelines.

CRITERIA

General Criteria Applicable to All Purposes

The riparian forest buffer shall be positioned appropriately and designed to achieve sufficient width, length, vertical structure/density and connectivity to accomplish the intended purpose(s).

Dominant vegetation will consist of existing, naturally regenerated, or seeded/planted native trees and shrubs suited to the soil and hydrology of the site and the intended purpose(s).

The riparian forest buffer will extend a minimum width to achieve the purpose(s). The width measurement shall begin at the top of the bank.

Overland flow through the riparian area will be maintained as sheet flow.

For sites to be regenerated or seeded/planted, excessive sheet-rill and concentrated-flow erosion will be controlled.

Excessive sheet-rill and concentrated-flow erosion will be controlled in the areas immediately adjacent and up-gradient of the buffer site.

Use tree and shrub species that are native and non-invasive. Substitution with improved and locally accepted cultivars or purpose-specific species is allowed. For plantings and seedings, only viable, high-quality and adapted plant materials will be used.

Favor tree and shrub species that have multiple values such as those suited for timber, biomass, nuts, fruit, browse, nesting, aesthetics and tolerance to commonly used herbicides.

Periodic removal of some forest products such as high value trees, medicinal herbs, nuts, and fruits is permitted provided the intended purpose is not compromised by the loss of vegetation or harvesting disturbance.

Necessary site preparation and planting shall be done at a time and manner to insure survival and growth of selected species for achieving the intended purpose(s). Refer to the standards Tree/Shrub Site Preparation, 490 and Tree/Shrub Establishment, 612.

Livestock shall be excluded. Refer to the standard Use Exclusion, 472.

State noxious weeds present on the site will be controlled or eliminated as necessary to achieve and maintain the intended purpose. If pesticides are used, refer to the standard Pest Management, 595.

No structures, permanent or temporary, or paved surfaces that would reduce or substantially alter the functioning of the riparian forest buffer will be included or installed. Vehicular traffic will be limited to only that necessary to perform operation and maintenance.

Additional Criteria to Improve Water Quality

The minimum width shall be 35 feet measured horizontally on a line that is perpendicular to the near edge of the water body, beginning at the top of the bank.

A functioning riparian forest buffer shall have sufficient canopy closure when trees are at least 10 to 15 years old, even though an acceptable time to assess tree establishment is three to five years after planting.

Surface water on land adjacent to the riparian buffer shall be controlled and maintained as sheet flow to and through the buffer. Sheet flow may be accomplished with well managed forest, pasture, or cropland; however, a Filter Strip, 393, may be needed immediately upslope to maintain sheet flow to the riparian forest buffer.

Additional Criteria to Reduce Excess Amounts of Sediment, Organic Material, Nutrients and Pesticides in Surface Runoff and Reduce Excess Nutrients and Other Chemicals in Shallow Ground Water Flow

The minimum width shall be extended to 50 feet and/or a Filter Strip, 393, shall be installed immediately upslope of a 35 foot wide buffer in high nutrient, sediment, and animal waste application areas, where the contributing area is not adequately treated or where an additional level of protection is needed.

Additional Criteria to Create or improve riparian habitat and provide a source of detritus and large woody debris.

The width will be extended to meet the minimum habitat requirements of the wildlife or aquatic species of concern.

Establish plant communities that address the needs of target aquatic and terrestrial wildlife and have multiple values such as habitat, nutrient uptake and shading.

Additional Criteria for Increasing Carbon Storage in Biomass and Soils

Maximize width and length of the riparian forest buffer.

Select plants that have higher rates of carbon sequestration in soils and plant biomass, and are adapted to the site to assure strong health and vigor. Plant the appropriate stocking rate for the site.

CONSIDERATIONS

Tree and shrub species that may be alternate hosts to undesirable pests should be avoided. Species diversity should be maximized to avoid loss of function due to species-specific pests.

Allelopathic impacts of plants should be considered.

The location, layout, and density of the buffer should complement natural features and mimic natural riparian forests.

Existing functional underground drains through the riparian area will pass pollutants directly to the outlet. To filter such pollutants, existing drains can be plugged, removed, or replaced with perforated pipe with end plugs to allow

passage and filtration of drain water through the riparian forest root zone. Existing drains may also be outleted up-gradient from the buffer. Caution is advised that saturated conditions in the riparian and adjacent areas may limit existing land use and management.

For sites where the continued functioning of drains is desired, trees and shrubs should not be planted over the drains. Maintain the area over and adjacent to the drains in herbaceous cover.

Maximizing widths, lengths, and connectivity of riparian forest buffers will maximize water quality, carbon storage, and wildlife habitat benefits. Incorporating a Filter Strip, 393, upgrade along the buffer may also increase these benefits.

The species and plant communities that attain higher biomass levels more quickly will sequester carbon at a faster rate. The rate of carbon sequestration is enhanced as riparian plants mature and soil organic matter increases.

Establishing trees and shrubs in riparian areas is not the same as traditional reforestation plantings. The soils and site conditions may be quite different from most reforestation projects (more fertility and weed pressure in riparian areas), and potential wildlife damage to trees and shrubs may be worse due to increasing function as wildlife travel corridors.

Shelters or tubes, with bird nets, are recommended for trees to enhance growth and protect the seedlings from rodents, rabbits, and deer. Multi-year herbicide application directly around shelters is recommended to improve tree growth and survival.

Fencing must be installed to effectively exclude livestock if the adjacent area is going to be pastured. This will protect tree and shrub roots from damage due to soil compaction and also from browsing of canopies. Livestock crossings, alternative water sources, and stabilized walkways through the riparian buffer have the potential to add considerable cost to the project, but are essential to meeting any intended water quality purposes.

PLANS AND SPECIFICATIONS

Specifications shall be prepared for each site and recorded using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation plan, or other approved documentation.

OPERATION AND MAINTENANCE

The riparian forest buffer will be inspected periodically and protected from adverse impacts that may occur from activities such as vehicular and pedestrian traffic, pest infestations (damaging weeds, insects, funguses, etc.), concentrated flows, pesticides, livestock or wildlife damage and fire.

Replacement of dead trees or shrubs and control of competing vegetation will continue until the buffer is, or will progress to, a fully functional condition.

Any manipulation of species composition, stand structure, or stocking by cutting or killing selected trees and understory vegetation shall sustain the intended purpose(s). Refer to the standard Forest Stand Improvement, 666.

Control or exclusion of livestock and harmful wildlife shall continue. Refer to the standard Use Exclusion, 472, as applicable.

Fertilizers, pesticides and other chemicals used to maintain buffer function shall not impact water quality.

REFERENCES

Palone, R.S. and A.H. Todd (editors.) 1997. Chesapeake Bay Riparian Handbook, USDA Forest Service, NA-TP-02-97, Radnor, PA. Web site: http://www.chesapeakebay.net/pubs/subcommittee/nsc/forest/handbook.htm

Alliance for the Chesapeake Bay, 1998. Pennsylvania Stream ReLeaf Forest Buffer Toolkit. Available through the Pennsylvania Department of Environmental Protection, Bureau of Watershed Conservation, Harrisburg, PA Web site: http://www.dep.state.pa.us/dep/deputate/watermgt/wc/Subjects/StreamReleaf/Forestbufftool/default.htm